

## USER INTERFACE SYSTEM

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 61/325,773, filed on 19 Apr. 2010, which is incorporated in its entirety by this reference.

[0002] This application is related to U.S. application Ser. No. 11/969,848 filed on 4 Jan. 2008 and entitled "System and Method for Raised Touch Screens", U.S. application Ser. No. 12/319,334 filed on 5 Jan. 2009 and entitled "User Interface System", U.S. application Ser. No. 12/497,622 filed on 3 Jul. 2009 and "User Interface System and Method", which are all incorporated in their entirety by this reference.

### TECHNICAL FIELD

[0003] This invention relates generally to touch sensitive user interfaces, and more specifically to a new and useful mountable systems and methods for selectively raising portions of touch sensitive displays.

### BRIEF DESCRIPTION OF THE FIGURES

[0004] FIG. 1 is a top view of the user interface system of a preferred embodiment.

[0005] FIG. 2 is a cross-sectional view illustrating the operation of a button array of a first preferred embodiment.

[0006] FIG. 3 is a cross-sectional view illustrating the operation of a button array of a second preferred embodiment.

[0007] FIGS. 4a-4c are cross-sectional views of the retracted, first stage extended, and second stage extended modes of a first variation of the second preferred embodiment as applied to a first variation of the sheet.

[0008] FIG. 5 is a schematic representation of the first variation of the second preferred embodiment as applied to a second variation of the sheet.

[0009] FIG. 6 is a schematic representation of the first variation of the second preferred embodiment as applied to a third variation of the sheet.

[0010] FIGS. 7a-7d are schematic representations the second variation of the second preferred embodiment as applied to a fourth variation of the sheet that includes a different number of first level cavities and second level cavities.

[0011] FIG. 8 is a schematic representation of the second variation the second preferred embodiment as applied to a fifth variation of the sheet that includes a different number of first level cavities and second level cavities.

[0012] FIG. 9 is a schematic representation of a combination of the first and second preferred embodiments.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] The following description of the preferred embodiments of the invention is not intended to limit the invention to these preferred embodiments, but rather to enable any person skilled in the art to make and use this invention.

[0014] As shown in FIGS. 1-3, the user interface system 100 of the preferred embodiments includes a sheet 102 that defines a surface 115 and at least partially defines a first level fluid vessel 127 at a first level within the sheet 102 and a second level fluid vessel 227 arranged at a second level within the sheet, wherein both the first and second fluid vessels 127 and 227 are arranged underneath the surface; a first volume of fluid 112 contained within the first level fluid vessel 127; and

a second volume of fluid 212 contained within the second level fluid vessel 227. The user interface system 100 further includes a displacement device coupled to the first and second fluid vessels 127 and 227 that selectively manipulates the first and second volumes of fluid 112 and 212, thereby either deforming a first and second particular region of the surface 113a and 113b, respectively (in the first preferred embodiment, as shown in FIG. 2) or deforming a particular region of the surface 115 to a first and second stage, respectively (in a second preferred embodiment, as shown in FIG. 3). The first and second stage may differ in height and/or magnitude of the deformation in the particular region 113 (as shown in FIG. 3), but may alternatively differ in the surface area of the deformed particular region, as shown in FIG. 7. Alternatively, the first and second stage may differ in height difference between a first and second portion of the surface 115. For example, the first stage may expand a first particular region to rise above of the surface while the second stage may deflate a second particular region substantially adjacent to the first particular region to go below the surface, increasing the height difference between the first particular region and the substantially adjacent second particular region. However, the first and second stage may differ in any other aspect of the deformed particular region. The user interface system 100 may also include a third level cavity that is preferably located at a third level within the sheet to achieve a third stage of deformation of the particular region 113 or to deform a third particular region 113. In each of the variations of the first, second, and third level fluid vessels as described above, a portion of each of the fluid vessels may be arranged along the same plane within the sheet 102, for example, as shown in FIG. 8. However, the user interface system may include any other suitable number or combination of fluid vessels on different height levels and different locations relative to the surface 115 within the user interface system.

[0015] The user interface system 100 of the preferred embodiments has been specifically designed to be attached or appended to the user interface of an electronic device, more preferably in an electronic device that utilizes a touch sensitive display as the main means to receive user input. In this variation, the sheet 102 and the first and second volumes of fluid 112 and 212 preferably cooperate to allow the transmission of an image from the display through user interface system 100 without substantial visual obstruction. The device may be, for example, a laptop computer, a tablet computer, a mobile phone, a PDA, a personal navigation device, a remote control, a personal media player, a camera, a trackpad, a dashboard in a car, or a keyboard. However, the user interface system 100 may be used with a device that does not include a display, for example, a steering wheel, a watch, a radio, or a hand held remote. The user interface enhancement system 100 may, however, be used as the user interface for any suitable device that interfaces with a user in a tactile and/or visual manner. As described in U.S. applications Nos. 11/969,848 and 12/319,334, the surface 115 of the user interface enhancement system 100 preferably remains flat until tactile guidance is to be given to the user in the location of the particular region 113. The displacement device 130 then preferably expands a portion of the first level fluid vessel 127 and/or the second level fluid vessel 227 to deform the particular region 113 outward, forming a deformation that may be seen and/or felt by a user, and providing tactile guidance for the user. The expanded particular region 113 preferably also provides tactile feedback to the user when he or she applies